CANADA. Mines,

Bureau of.

(report of the)

EXPLOSIVES DIVISION

Annual Report.

(calendar year)

1963

(DEPARTMENT OF MINES AND TECHNICAL SURVEYS)

CANADA

report of the

EXPLOSIVES DIVISION

calendar year **1963**

H. P. KIMBELL
Chief Inspector

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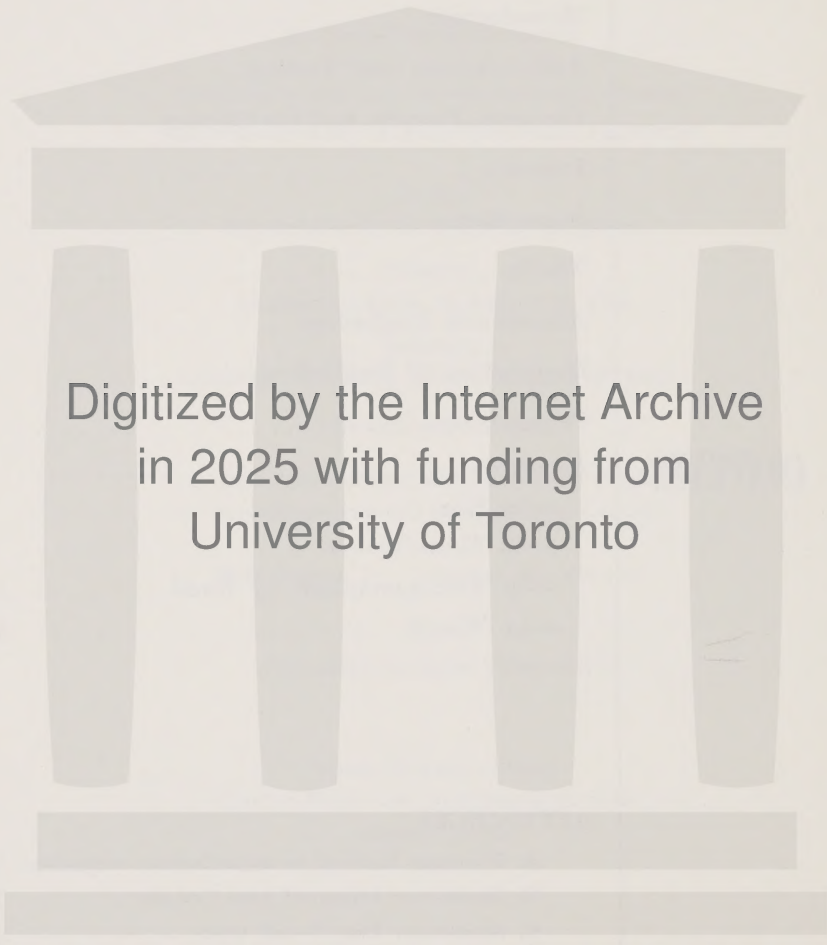

THE EXPLOSIVES DIVISION

exists solely in the interests of public safety. Its function is to administer the *Explosives Act* which, by a system of licences and permits supported by inspection, controls the manufacture, authorization, sale, storage and importation of explosives, as well as the transportation of explosives by road.

offices and staff

All licences, permits and certificates are issued at the Division's main office in the Mines Branch Building, 555 Booth Street, Ottawa 4, where a staff of four inspectors and nine clerical people is maintained. Two other inspectors carry out their duties from branch offices at 739 West Hastings Street, Vancouver, B.C., and the Bedford Institute of Oceanography Building, Dartmouth, N.S.

manufacture

Production of commercial blasting explosives in licensed factories rose sharply to 201 million pounds from 180 million pounds in 1962. In spite of this increase, and in keeping with the trend of the last few years, there was nevertheless a slight reduction in the tonnage of nitroglycerin explosives produced. Based on a rough estimate of do-it-yourself blending under the "Ammonium Nitrate and Fuel Oil Order" the production of nitroglycerin explosives comprises about 36 per cent of total consumption.

Technological innovations of the new 'explosives age' continue to be developed. Outstanding in this respect in 1963 was the licensing in June, at the Carol Lake,

Newfoundland, open pit of the Iron Ore Company of Canada, of what constitutes a mobile factory. In this operation, equipment for continuously blending the ingredients of a slurry explosive is installed in the van of a truck. After the ingredients are loaded in the magazine area the vehicle is driven to the mining bench where the slurry is mixed - at prescribed safety distances - and pumped through hose directly into drill-holes. Considerable tonnages were successfully produced in this novel factory and there seems no doubt that other such units will be licensed in 1964.

- courtesy of Iron Ore Company of Canada

'Mobile factory' leaving magazine area.

The year was marked by another 'first' in Canada. On a 3,000-acre site near Rockwood, Manitoba, just outside the metropolitan area of Winnipeg, Canadian Bristol Aerojet Limited commenced production and filling of solid propellant fuel in the "Black Brant" series of upper-atmosphere sounding rockets. This plant, licensed at the end of May, was designed basically to principles developed by the Canadian Armament Research and Development Establishment at Valcartier, Quebec, which was supported by the experience of Aerojet-General Corporation of the United States.

The list of licensed factories in Appendix A numbers twenty-seven, four more than in 1962. In addition to the two new ones mentioned above, Remington

Arms of Canada Limited commenced the filling of shotgun cartridges in a factory at Long Branch, Ontario, and Universal Pyrotechnics started operation of a small factory for highway fusees at Orangeville, Ontario. Universal Pyrotechnics is actually the successor of Safety Flares and Fireworks Limited which discontinued operation in the same factory in 1960.

authorization and testing

The physical and chemical testing of explosives, as required by the Act, is performed in the Explosives Laboratory administered by the Fuels and Mining Practice Division of the Mines Branch. Samples examined during 1963 totalled 105, as follows:

Blasting Explosives	
(a) for authorization	10
(b) run-of-work	9
Small-arms Ammunition	15
Fireworks	55
Blasting Accessories	2
For other Government Departments	14

Manufacturers submitted numerous samples of aluminized slurries for authorization during the year.

"For other Government Departments" denotes assistance in assessing the hazards of handling and transporting explosives and other dangerous goods. Such assistance was provided to the Department of National Defence, the National Harbours Board, the Post Office Department, as well as to the RCMP and other police agencies.

A complete list of explosives authorized for manufacture and importation is given as Appendix D.

licences, permits and certificates

The following were issued during 1963; 1962 figures are in parentheses:

Factory Licences	27	(23)
Magazine Licences (storage for sale)	441	(418)

Temporary Magazine Licences (storage for private use)	1,084	(1,081)
Registered Premises Certificates (storage of small quantities for sale)	86	(97)
Transportation Permits (by road)*	285	(269)
General Importation Permits (one shipment only)	1,225	(1,324)
Annual Importation Permits	59	(60)

imports

Appendix B is a statement, by class and division, of explosives imported during the year under the terms of the importation permits referred to above. The nearly 4 1/2 million pounds "for other manufacturing purposes" represents mainly nitrocellulose used in the manufacture of lacquers, coated fabrics and films. About two thirds of the safety cartridges were .22 caliber and blank rounds.

inspections

The following inspections were carried out during the year; 1962 figures are in parentheses:

Factories	70	(60)
Magazines	2,237	(2,212)
Registered Premises	101	(120)
Transportation	121	(107)
Storage in Unlicensed Premises	369	(139)

These statistics include the valuable work done by members of the Royal Canadian Mounted Police, all of whom are appointed Deputy Inspectors of Explosives by regulation made under the Act.

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*Modes of transport other than by road are governed by regulations administered by the Department of Transport and the Board of Transport Commissioners for Canada.

Concerning "storage in unlicensed premises", the regulations allow the keeping, for private use and not for sale, of up to 150 pounds of dynamite and 2,000 detonators without a licence. But it is frequently through the carelessness of these users of small quantities, in violation of the Explosives Regulations, Part XIII, that unauthorized persons, often children, gain possession. Inspectors are attempting to visit more of the small users; the identity of such persons is available from the sales records kept by all licensed vendors.

thefts

The isolation of magazines, as required by law, has the natural tendency to defeat security, and every year we have to report cases of breaking, entering and theft. In 1963, twenty-one licensed magazines were broken into and explosives stolen. In most instances the police were unable to find the thieves.

There were reports of four other thefts from premises not required to be licensed. In three of these the explosives were not stored in a locked "detached store" or locked "suitable receptacle" as required by the regulations governing storage of small quantities.

Security at licensed factories is usually good but in 1963 there were cases of trespassing and vandalism at three such plants. Someone climbed the fence around a Manitoba factory, broke the lock on one of the magazines and stole 200 detonators. Two boys gained entrance to a fireworks factory in Ontario and stole 23 mortar shells, but the perpetrators of this escapade were identified when a father investigated singed eyebrows. Trespassing within the magazine area of a factory in Quebec caused very serious concern because of terrorist activity in the province. On three occasions explosives packages were tampered with but there was no evidence that any dynamite was stolen.

Every year some of the thefts are by juveniles bent on excitement and mischief. This year there were three, in addition to the one noted above. There was great excitement at a picnic when one child announced that he had planted a 'bomb' in a field; this turned out to be one of many detonators which had been stolen from a bin-type magazine after the hinges had been pried loose. In another instance two youths stole three sticks of dynamite and exploded it near a creek. The other affair became known when the driver of a school bus found a detonator on the floor of the vehicle; a 10-year-old boy had taken several detonators from a shed on his father's premises.

Total quantities involved in this year's thefts are 2,823 pounds of blasting explosives, 7,438 detonators, 2,300 feet of detonating fuse, 1,500 feet of safety fuse and 23 fireworks shells.

abandoned explosives

Reports received under this heading always indicate a serious lack of respect for explosives but it is unusual, as well as surprising and disappointing, to find carelessness by the employees of a large construction company that regularly stores explosives under magazine licence. Over a year after this company had written to cancel its licence, advising that the work at a construction site was completed, it was reported to the local police authority in Quebec that the magazine still contained 4,200 pounds of blasting explosives. Another member company of the same group committed the same type of offence in Ontario; this time 5,236 pounds of blasting explosives and a quantity of detonating fuse, boosters and detonators were found abandoned in a formerly licensed magazine. This rather unbelievable neglect resulted in prosecution and conviction under the Act.

Forty-one other reports were received, chiefly through complaints by citizens to Deputy Inspectors of Explosives of the RCMP. These were explosives that had been cached and forgotten, simply lost, or deliberately abandoned. The human tendency to keep surplus quantities of things for some future indefinite purpose can be very dangerous when explosives are involved, but small users are often guilty of this mistake. Too often the finders are exploring juveniles. Examples of some of this year's incidents follow.

Three small boys escaped possible serious injury when they used rocks to set off three detonators which were among 27 they found in a scrap-metal yard. One of the boys turned over the remainder to his mother who notified the police.

Two teen-aged boys on a gopher hunt reported finding a part case of dynamite in an old cellar on an isolated prairie farm. The owner had used dynamite in 1962 for clearing land and had cached the surplus "because they had intended to use more of it."

A nine-year-old boy found a package of 96 detonators near a power-line pole. Apparently the contractor erecting the poles had simply "lost" them.

Two young boys found four sticks of dynamite in a ravine used as a dumping area. It is believed the explosive was discarded there after it was stolen from a local mine.

A citizen reported to police the finding of dynamite in the possession of children. Investigation disclosed that it had come from an old shed near a house where a well-driller had lived several years ago. One of the boys had kept five sticks in a bedroom closet at home. The boys had removed the paper from some sticks and had tried to burn the dynamite, explaining "but it only sizzled".

Five sticks of dynamite and sixty-four detonators were found in a small shack adjacent to a boathouse which had just come into the possession of a new owner. The previous owner was prosecuted and fined for illegal storage.

The driver of a milk-delivery truck reported picking up a stick of dynamite on his route and it was soon learned that other sticks were turning up at various places - one in a postal box - in the suburbs of an eastern city. Juveniles had stolen the explosives from a licensed magazine.

destruction of explosives

Destruction was necessary in most of the cases of abandonment reported above, amounting to more than 1,000 pounds of blasting explosives and 1,182 detonators. In addition there were forty-two reports of explosives having been destroyed, usually because they had become deteriorated through poor or prolonged storage. One important duty of inspectors is to examine stocks for deterioration and request early use or destruction if necessary. Total quantities involved amounted to 13,520 pounds of blasting explosives and 5,317 detonators.

The proprietor of a joke shop in Vancouver was found in possession of unauthorized fireworks labelled "Atomic Smoke Bombs", which he voluntarily surrendered for destruction. There had been complaints that youths had set off such devices in movie theatres.

prosecutions

Although the Division's motto has always been "Education if possible; prosecution if necessary", every year there are some offences which must be dealt with by the courts. During 1963 there were twenty-seven of these cases, just less than the average for the last several years.

Fourteen of the prosecutions followed offences for explosives being unsafely and insecurely stored. In one instance it was a case of "locking the stable door after the horse was stolen" because it was only after injury to two boys, who had pilfered explosives without any difficulty, that the owner was prosecuted. It took a theft in another instance to disclose insecurity, with prosecution following. Fines were as much as $100.

Carelessness in transportation resulted in ten prosecutions, and there were three involving offences in both storage and transportation. Again fines up to $100 were imposed. In some instances multiple charges were laid, the violations including: carrying of explosives without covering exposed steel; stopping unnecessarily in a place where public safety is endangered; failure to separate dynamite from detonators; carrying gasoline with dynamite; leaving vehicle

unattended; no "EXPLOSIVES" warning sign; no fire extinguisher; exceeding the speed limit; and smoking by the driver in the cab. All too often explosives are loaded indiscriminately onto a utility vehicle along with tools and materials of the trade.

Reports were also received of four court actions under the Criminal Code for offences involving explosives. Three concerned illegal possession, and in the fourth a road-construction contractor was fined $250 for failing to take adequate precautions during blasting, thereby causing property damage.

There were three reports of prosecutions under provincial mining legislation, and a violation under the City of Ottawa by-law brought the maximum fine of $300 when a contractor's employee was careless enough to leave dynamite lying about near the residence of the Prime Minister. The same contractor and two of his employees were prosecuted under the Act for illegal storage in Montreal a little later.

accidents

Appendix C, Part I, is a statistical analysis of all explosives accidents which came to notice during 1963, based on the definition that an "accident" is one causing death or injury. The total from all causes, 69, reflects the continuous and pleasing decrease in the accident figure in recent years. The figures for 1962 and 1961 were 82 and 85 respectively, while the average for the five years 1956-1960 was 113. It is not possible to determine how much of this general improvement is due to the greatly increased production and use of non-nitroglycerin explosives but the effect of this development is probably significant.

—in use

(1963) 39 accidents, 10 killed, 46 injured

(1962) 49 accidents, 11 killed, 50 injured

It is in this category that the main improvement continues to be shown but it is noticeable that the fatality rate is not in proportion with the reduction in the number of accidents. In mines and quarries (controlled by provincial mining legislation) there were 29 accidents, in which 4 people were killed and 38 injured, while the average for 1961 and 1962 was 34 accidents, 5 killed and 35 injured. In the 10 accidents that occurred elsewhere, 6 were killed and 8 injured.

Two fatal accidents sustained by farmers engaged in clearing land are worthy of mention here. They also appear under the heading "Elsewhere" in Appendix C, in the category "Returning too soon to blasting site".

A Saskatchewan farmer, aged 26, was instantly killed while using dynamite, detonators and safety fuse to break rocks on his farm. He lit a fuse about 18 inches long and "thinking that it was not properly ignited, he started to light it with another match and the shot went off." Another man, a few feet away, suffered an eye injury from flying debris.

In Ontario, a farmer and his 11-year-old son were killed and a neighbor critically injured while they were attempting to break a large rock with dynamite. The farmer's wife and two daughters were watching from a distance and told the police that "the three seemed to be examining the fuse, as if it hadn't ignited, when 15 sticks of dynamite under the rock suddenly exploded."

Ignorance of the properties of safety fuse appears to have been a vital factor in these tragedies. Safety in using explosives cannot be governed under a federal statute but it is significant that most provincial regulations require that (a) no fuse shorter than three feet shall be used, and (b) there shall be a waiting period of at least 30 minutes before return to a suspected misfire. All such accidents are not caused by inexperience however; sometimes it is carelessness or imprudence. On Vancouver Island the employee of a logging company, holder of a blasting certificate, was decapitated when he dallied too long during the lighting of 14 charges set for blowing stumps. Perhaps the significant remark in the report is "I think I forgot one down here", but the "forgotten one" literally blew the speaker's head off.

—in manufacture

(1963) 1 accident, 1 killed

(1962) 4 accidents, 4 injured

A perfect record for the year was marred by the tragic death of a youthful employee at the burning ground of the Papineauville factory of Hand Chemical Industries Limited. The young man was emptying a container of waste composition containing phosphorus when it ignited by friction; his clothes caught fire and he sustained burns that resulted in his death about 8 hours later. Since the accident all phosphorus scrap is being handled in the wet condition. Questioning of the employee who had previously collected factory waste for some time brought out the fact that he had on several occasions experienced accidental ignitions under similar circumstances but, feeling them insignificant, he had not reported them. It is one of the terms of a factory licence that "Reports shall be rendered to the Chief Inspector of Explosives immediately on the occurrence of any accidents which may arise in the factory and which involve the ignition of any explosive material whether or not accompanied by injury to personnel or damage to material." The object lesson herein is significant.

Although there were no other injuries of any consequence during 1963 there were several other accidents that are worthwhile mentioning because of the lessons they teach.

An explosion in a nitrocellulose pulping house at Canadian Arsenals Limited, Valleyfield, caused extensive damage to the building. Maintenance work was being performed during shutdown and two painters were using an air-driven sanding machine for removing rust on tanks in preparation for painting. Sparks ignited dry explosive and the flash was transmitted on a film of nitrocellulose across the roof of the tank to a dewatering box containing sufficient nitrocellulose to detonate. The flash from this explosion appears to have again travelled on a film of nitrocellulose within a 6-inch pipe to another dewatering box where a second explosion occurred. Of course this accident could not have happened if the building and equipment had been ".... cleaned by the removal of all explosive.... and by thorough washing ...." as required by the regulations governing factories.

At the same factory there was a serious fire in a building used for finishing operations on rocket-propellant grains. The building is a compartmented one designed for several operations, but fortunately only one worker was on duty at the time. Ignition occurred on the machine in the "end cutting" room. The operator did not make proper use of the protection afforded by the remote control design and consequently fire spread to the entire building. He escaped safely and the sprinkler system prevented serious damage to the building although nearly 4,000 pounds of propellant was burned. Changes have now been made in the equipment arrangement to prevent propagation of fire in any future such occurrence.

An explosion at the Filling Division factory of Canadian Arsenals Limited caused considerable structural damage to a building where photoflash cartridges were being manufactured. Complex mechanical equipment had been designed to produce finished photoflash cartridges in one continuous operation but the explosion proved that the sensitive composition does not lend itself to such extensive automation. It is a credit to the design engineers however that remote control features allowed 17 operators to escape safely.

Within a few days there were two fires at the Papineauville, Quebec, factory of Hand Chemical Industries Limited and in each instance a fireworks assembly building was gutted. The first fire was started by a spark during an operation involving an electric drill for perforating clay plugs used in the manufacture of pinwheels. Only one operator was present and she escaped safely. The second fire which occurred after operating hours, originated in a corner of the building where an electric light bulb had been left burning to keep a water pipe from freezing.

—in transportation by road

No deaths or injuries were attributable to explosives during movement on the roads, but there were two accidents involving destruction of explosives by fire and explosion, and other incidents which are worthy of record because of their serious potential. Nowadays, every person who drives a car or truck on any public road assumes a serious responsibility; but the driver of a vehicle loaded with explosives faces the possibility of a specially awesome disaster.

A tractor semi-trailer carrying military explosives was completely destroyed by fire and explosion on the Alaska Highway. The load was a mixed one, comprising explosives - 2,629 pounds contained in such devices as rocket motors - and mail - 26,000 pounds of second-class material and parcel post. When the driver noticed the fire through the rear-view mirror he stopped and tried to control it with extinguishing equipment but, failing in this, he uncoupled the tractor and left the van to its fate. There were intermittent violent explosions for more than 2 hours but no one was injured. The fire apparently originated in the van and although the cause was not definitely established it is felt that a combustible material in the mail parcels was to blame. Section 56 of the Regulations warns that "due precautions shall be taken by means of a partition or otherwise and by careful stowing, to secure the explosive from being endangered by any other article or substance transported in the vehicle." It is obvious that materials whose character and properties are unknown must never be carried with explosives. The rubble after the fire included photographic materials, film, medical supplies, rifles, cosmetics etc., and a very large assortment of unidentifiable bottles, vials, hypodermic needles etc.

In Quebec a tractor semi-trailer carrying 10,000 pounds of dynamite caught fire and the load was completely destroyed. Fortunately there was no explosion and no one was injured. The fire, which originated in the tarpaulin covering the packages, was probably ignited by a spark from the diesel exhaust stack just to the rear of the cab. This occurrence and previous incidents of fire starting in this manner prompted the important decision to no longer grant Explosives Transportation Permits for vehicles not equipped with vans that are fire-resistant and totally enclosed. All holders of permits have been advised that the deadline for this requirement is the expiry date of current permits, namely April 1, 1964.

A truck carrying 10,000 pounds of dynamite rolled on its side when the driver lost control attempting to avoid another vehicle on a curve. Because of the low speed, and the fact that the load was totally enclosed in a van, scattering of the explosives was minimized and only six packages were damaged. There was no fire and the driver and helper were only slightly injured.

When a truck carrying 20,000 pounds of AN/FO explosives upset in a snow-filled ditch, nearly half of the 400 bags burst open. The incident occurred during a blinding snowstorm as the driver apparently got too close to the edge of the road and lost control of the vehicle. No serious injuries or fire resulted.

An exploding dynamite cap caused the severe facial injuries suffered by this 3-year-old boy. Fortunately, his eyesight was not lost.

A fire broke out under the hood of a vehicle carrying 10,000 pounds of dynamite. Fortunately the incident happened within the confines of a licensed factory of Canadian Arsenals Limited, whose fire department quickly extinguished the blaze. The fire was due to defective electric wiring, emphasizing the importance of the daily inspection required by Section 57 of the Regulations.

Fire was noticed in the undercarriage of a truck carrying 16,000 pounds of AN/FO explosives before it left the factory of DuPont of Canada Limited at North Bay, Ontario. Again it was fortunate that factory personnel were on the spot to help extinguish the fire, especially since one of the truck's extinguishers was defective and inoperative. Fire extinguishers are of no use unless they are regularly inspected. This fire was apparently the result of driving while the emergency brake was engaged.

Two men were killed in a collision between a truck and an automobile. The resulting fire revealed the presence of a small quantity of explosives when there was a detonation during fire-fighting efforts. It was very fortunate that no one was injured by the explosion. The owner of the truck was prosecuted for moving dynamite and detonators without the required separation and for other infractions of the regulations.

—in misuse

(1963) 24 accidents, 2 killed, 30 injured

(1962) 23 accidents, 2 killed, 28 injured

Appendix C, Part II, is a brief description of the circumstances of all misuse accidents. There is the usual list of accidents caused by playing or tampering with detonators and other explosives, often with tragic consequences. Many of the youthful victims would not have gotten into trouble if their elders, many of them relatives, had observed the elementary security precautions required by the Explosives Act Regulations, as well as the law of common sense. The admonition on the Division's warning poster - THE CHILD YOU SAVE MAY BE YOUR OWN - frequently turns out to be very apt.

Fireworks are a glamorous source of entertainment but every year there are many accidents to report. Chinese fire-crackers (although only small sizes are now authorized under the Act) are a frequent cause of complaint, but it is often mischief - and sometimes vandalism - that are the real culprits. Boys tend to become bored with a simple 'bang' and they devise various methods to increase the effect.

This year there were three accidents from fireworks displays sponsored by community organizations, even though these events are supervised. Those planning fireworks entertainment should make sure that supervisors are competent and safety conscious, and should secure the assistance of local police or fire-protection authorities. Two important precautions for persons directing

a fireworks display are: (a) keep the packages containing the fireworks at a safe distance from the firing site and make sure they are carefully guarded from curious youngsters, and (b) carefully examine the area for unexploded fireworks after the event.

Shooters whose hobby includes the hand-loading of small-arms ammunition should take warning from an accident described in the "miscellaneous" category of the list of misuse accidents. Smokeless gunpowder is a propellant explosive for which familiarity tends to breed carelessness. The victim in this accident was carrying out his operations in the basement of his home and had gone upstairs to watch television and have a smoke. When he went back downstairs he was still smoking a cigarette. As he bent over the loader a spark ignited a partly filled shot-shell which communicated to a glass jar containing the immediate supply of one pound. Our inspector who investigated commented that the injuries could easily have been fatal; fortunately the man escaped with burns, and cuts from flying glass. Hand-loading has always been allowed on private premises but only under the careful precautions stipulated in the regulations.

APPENDICES

appendix A

FACTORIES LICENSED TO MANUFACTURE EXPLOSIVES – 1963

Owner	Location of Factory	General Nature of Product
W.F. Bishop & Son Limited	Unionville, Ont.	Fireworks
Canadian Arsenals Limited	St. Paul l'Ermite, Que.	Military ammunition
Canadian Arsenals Limited	Valcartier, Que.	Military ammunition
Canadian Arsenals Limited	Nitro, Que.	Military explosives
Canadian Bristol Aerojet Limited	Rockwood, Man.	Propellants
Canadian Industries Limited	Beloeil, Que.	Blasting explosives, fuse powders, nitrocompounds
Canadian Industries Limited	Brainerd, Man.	Blasting explosives
Canadian Industries Limited	Brownsburg, Que.	Ammunition, detonators, blasting accessories, pyrotechnic signals
Canadian Industries Limited	Calgary, Alta.	Blasting explosives
Canadian Industries Limited	James Island, B.C.	Blasting explosives
Canadian Industries Limited	Nobel, Ont.	Blasting explosives
Canadian Industries Limited	Seven Islands, Que.	Blasting explosives
Canadian Industries Limited	Sudbury, Ont.	Blasting explosives
Canadian Safety Fuse Company Limited	Brownsburg, Que.	Safety fuse, detonating fuse, blasting accessories
Consolidated Mining and Smelting Company of Canada Limited	Kimberley, B.C.	Blasting explosives
Cyanamid of Canada Limited	Niagara Falls, Ont.	Nitroguanidine
Delta Explosives Limited	St. Joseph du Lac, Que.	Blasting explosives
DuPont of Canada Limited	North Bay, Ont.	Blasting explosives
Gevelot of Canada Limited	Saskatoon, Sask.	Ammunition
Hand Chemical Industries Limited	Cooksville, Ont.	Fireworks and military pyrotechnics
Hand Chemical Industries Limited	Papineauville, Que.	Fireworks and military pyrotechnics
Iron Ore Company of Canada	Schefferville, Que.	Blasting explosives
Iron Ore Company of Canada	Wabush Lake, Nfld.	Blasting explosives
Remington Arms of Canada Limited	Long Branch, Ont.	Ammunition
Universal Pyrotechnics	Orangeville, Ont.	Highway fusees
Winchester-Western (Canada) Limited	Cobourg, Ont.	Ammunition
XL Explosives Limited	Hawkesbury, Ont.	Ammunition

appendix B

EXPLOSIVES IMPORTED INTO CANADA, 1963

Class	Division	Description	Quantity
I	.....	Gunpowder	12,500 lb.
II	.....	Nitrate mixtures	1,090 lb.
III	.....	Nitro-compounds -	
	1 and 2	Blasting Explosives	211,220 lb.
	2	Propellants	42,110 lb.
	2	For use in explosives factories	2,081,619 lb.
	2	For other manufacturing purposes	4,477,374 lb.
VI	1	Primers	2,230,178 units
	1	Safety fuse	6,000 feet
	1	Safety cartridges	44,570,915 rounds*
	2	Detonating fuse	476,685 feet
	2	Seismic explosives	62,327 lb.
	3	Detonators	319,085 units
VII	2	Manufactured fireworks	923,322 lb.
		Miscellaneous	28,589 lb.

*Breakdown:

Military surplus	656,978	rounds
.22 calibre and blanks	28,303,130	"
Other	15,610,807	"

appendix C

Part I - ACCIDENTS INVOLVING EXPLOSIVES, 1963

Circumstances or Cause	Mines and Quarries			Elsewhere			Total		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
In Use									
a Delaying too long in lighting fuse	4	1	5	-	-	-	4	1	5
b Premature firing of electrical blast	1	-	1	-	-	-	1	-	1
c Not taking proper cover	3	-	4	1	-	1	4	-	5
d Projected debris	2	-	7	1	-	1	3	-	8
e Returning too soon to blasting site	2	-	2	3	4	2	5	4	4
f Improper handling of misfires	...	...	...	1	1	-	1	1	-
g Rough tamping	2	-	2	-	-	-	2	-	2
h Ignition of explosives by flames, sparks etc.	-	-	-	-	-	-	-	-	-
i Drilling into explosives	6	-	7	2	1	1	8	1	8
j Striking unexploded charge in removing debris	1	-	1	-	-	-	1	-	1
k Preparing charges	...	...	...	1	-	1	1	-	1
l Using too short a fuse	-	-	-	-	-	-	-	-	-
m Insufficient ventilation after blasting	2	-	2	-	-	-	2	-	2
n Springing shots	-	-	-	-	-	-	-	-	
o Inadequate guarding	3	1	4	1	-	2	4	1	6
p Various	3	2	3				3	2	3
Total	29	4	38	10	6	8	39*	10	46
In Manufacturing	...	...	...	...	...	...	1	1	-
In Storage	...	...	...	...	...	...	-	-	-
In Transportation (by road)	...	...	...	...	...	...	-	-	-
Total	...	...	...	...	...	...	1	1	-
In Misuse									
a Detonators	...	...	...	...	...	...	8	-	9
b Other Explosives	...	...	...	...	...	...	4	2	6
c Fireworks	...	...	...	...	...	...	9	-	12
d Home-made explosives	...	...	...	...	...	...	3	-	3
Total	...	...	...	...	...	...	24+	2	30
Miscellaneous	...	...	...	...	...	...	5+	1	5
Total, All Circumstances	...	...	...	...	...	...	69	14	31

*These accidents occurred in circumstances not directly controlled by the Act.
+Brief descriptions of these accidents are given on the following pages.

appendix C

Part II - MISUSE OF EXPLOSIVES

Ref. No.	Cause of Accident	Killed	Injured
	(a) Detonators		
1-1	A 17-year-old boy suffered the loss of his right hand, severe damage to his left hand, including the loss of 2 fingers, a severe blast wound to his right thigh and extensive burns to his face when he exploded a can of 20 detonators with an electric current. He said he had found the detonators in an abandoned shack some months before.		1
2-1	A 13-year-old boy received cuts to his face, hands and legs when he threw a detonator into a fire and it exploded. The detonator was one of two he said he found "in a tree".		1
1-2	A 14-year-old boy lost the sight of one eye when a detonator exploded as he was attempting to prepare a dynamite charge to blow a hole through ice for fishing. He thought he must have "dropped the axe on the cap".		1
1-3	A 3-year-old boy suffered severe eye and facial injuries when a detonator he was playing with exploded. He found the detonator buried in the ground near a well where it had been overlooked by his father.		1
3-4	A 13-year-old youth suffered a severe eye injury when a detonator he was heating with a flame exploded. The detonator was one of several his 19-year-old uncle had acquired "for the fun of it" and cached away on a beam in an unlocked shed.		1
1-7	A 15-year-old boy lost the thumb and forefinger of his right hand when a detonator he was heating with a match exploded. He had pulled the detonator out of a pre-loaded seismic shot hole.		1

appendix C

Part II - MISUSE OF EXPLOSIVES (cont'd)

Ref. No.	Cause of Accident	Killed	Injured
	(a) Detonators (cont'd)		
1-8	A 10-year-old boy suffered a severe eye injury and his 12-year-old companion was slightly injured about the waist from the explosion of 2 detonators they had thrown into a fire. They had found 4 detonators and 2 sticks of dynamite in an unlocked steel box on a compressor. The owner was prosecuted.		2
5-10	An 8-year-old boy suffered puncture wounds to his head, arms, legs and face when he exploded a detonator by striking it with a hammer. He had found the detonator in a neighbor's yard.		1
	(b) Other Explosives		
2-3	Two boys were killed and one injured from the explosion of an army mortar bomb they had found and struck with an axe. The boys were members of a scout troop camping in British Columbia on terrain used for army training during World War II. An intensive search revealed 55 more bombs, 50 of them live.	2	1
2-8	A 16-year-old boy suffered severe head injuries when some railway track torpedoes he was playing with exploded. He had found 40 of these signals in a brown paper bag under a railway loading ramp.		1
3-8	A 15-year-old boy received severe flesh wounds when a .32 calibre cartridge exploded. He was apparently trying to take it apart.		1

appendix C

Part II - MISUSE OF EXPLOSIVES (cont'd)

Ref. No.	Cause of Accident	Killed	Injured
	(b) Other Explosives (cont'd)		
6-10	Three youths, aged 18 to 22, suffered severe face and hand injuries as well as considerable eye damage when two sticks of dynamite exploded as they were trying to re-light the fuse. They had purchased 10 sticks under false pretences and had detonated 7 of these "for the fun of it" in and around Edmonton. The tenth stick was recovered by the police.		3
	(c) Fireworks		
1-4	Two small boys suffered minor burns when they threw a firecracker into a sewer manhole and sewer gas ignited.		2
2-4	A 10-year-old boy suffered severe facial burns and damage to one eye when a firecracker exploded in his face.		1
1-5	A 2-year-old boy suffered first-, second- and third-degree burns to his face, hands and legs when he set off a box of fireworks, which, along with matches, had been left within his reach.		1
2-5	Two boys, aged 9 and 7, suffered severe burns when they played with fireworks found during or following a community-sponsored display.		2
1-10	An 11-year-old boy suffered burns to his thigh when several firecrackers exploded in his pocket.		1
2-10	An 11-year-old boy suffered serious eye injury when a companion threw fireworks at him.		1

appendix C

Part II - MISUSE OF EXPLOSIVES (cont'd)

Ref. No.	Cause of Accident	Killed	Injured
	(c) Fireworks (cont'd)		
3-10	An 11-year-old boy suffered burns to his left eye from an exploding firecracker. He had picked it up thinking it was a dud.		1
4-10	A 7-year-old boy suffered severe burns to his hand when firecrackers exploded in his pocket.		1
1-12	Two 13-year-old boys were fortunate in sustaining only minor injuries as their eyebrows were singed following ignition of powder from a display firework which they had taken apart. They had stolen 23 mortar shells from a licensed fireworks factory.		2
	(d) Home-made Explosives		
4-4	A 10-year-old boy suffered third-degree burns to both hands from the explosion of a gaily wrapped package he had found in a telephone booth. A 15-year-old boy was later prosecuted for making the 'bomb' and planting it in the booth.		1
1-6	A youth blew his right hand off when experimenting with a nitro-compound. He had made the explosive in the basement of his home by following instructions in a library book.		1
2-7	A 15-year-old boy lost part of his index finger and lacerated a thumb when a home-made rocket exploded.		1

appendix C

Part II - MISUSE OF EXPLOSIVES (cont'd)

Ref. No.	Cause of Accident	Killed	Injured
	(e) Miscellaneous		
5-4 and 3-5	One man was killed and another seriously maimed as a result of bombing outrages in Quebec.	1	1
2-6	A man helping to supervise a fireworks display suffered minor burns to his face when he was struck by a piece of rocket casing. He was wearing safety glasses and thus prevented serious eye injury.		1
3-7	One man lost his left arm below the elbow and his companion suffered deep lacerations and puncture wounds when a mortar shell exploded just after it left the launching tube. They were conducting trials prior to a community fireworks display.		2
4-8	A man hand-loading shotgun shells received severe burns and cuts to his head, face and neck by the explosion of a glass jar of smokeless powder. A spark from a cigarette ignited a partly filled shell which exploded, setting off the nearby jar containing one pound of explosive.		1

appendix D

AUTHORIZED EXPLOSIVES

Manufactured in Canada

Canadian Arsenals Limited, Ottawa, Ont.
Military Explosives

Canadian Bristol Aerojet Limited, Winnipeg, Man.
Solid Propellant Motors

Canadian Industries Limited, Montreal, Que.
Detonators, Electric Detonators and Squibs
Delay Switch
Dextrinated Lead Azide
Heater Cartridge
Highway Flares
Igniter Cord Electric Starter
Lead Styphnate
Marine Flares
MS Detonating Relay
Percussion Caps
Railway Fusees
Railway Track Signals
Safety Cartridges
Styphnic Acid
"Sureshot" and "Seismic Marine" Boosters
Tetrazene

Amex and Amex II
Amite
Ammonia Dynamite - 20, 25, 30, 35, 40, 50 and 60 per cent
Ammonia Dynamite, Agricultural - 60 per cent (for export only)
Ammonia Dynamite Extra - 40, 50, 60 and 70 per cent (for export only)
Ammonia Dynamite, Free Running - 40 and 65 per cent
Ammonia Dynamite, High Density - 20, 25, 30, 35, 40, 50 and 60 per cent (for export only)
Ammonia Dynamite, Low Density - 20, 25, 30, 35, 40, 50, 55 and 60 per cent (for export only)
Ammonia Dynamite, Quarrying - 60 per cent
Ammonia Dynamite, Seismograph - 60 per cent (for export only)
Ammonia Dynamite, Stumping - 20 per cent (for export only)
Ammonia Gelatin - 30, 35, 40, 50, 60, 65, 75, 80 and 90 per cent (for export only)

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured in Canada (cont'd)

Canadian Industries Limited (cont'd)
- Belite A and B - 60 per cent
- Black Blasting Powder
- Blastol - 60 per cent
- BRX-7 - 75 per cent
- Cilgel-B and Cilgel-C - 70 per cent
- C-I-L- Dynamite No. 3
- C-X-L-ite
- Detonating Fuse Primer
- C-I-L Ditching Dynamite and Ditching Dynamite (export)
- Dygel - 75 per cent
- Dynamex - 40, 50, 60 and 70 per cent
- Exel-G, Exel-S and Exel GW - 75 per cent
- Explosives BL-100, BL-112, BL-114, BL-115, BL-116, BL-125, BL-130, BL-132, BL-134, BL-135, BL-136, BL-144, BL-145, BL-146, BL-147, BL-148, BL-151, BL-152, BL-153, BL-156, BL-164, BL-165, BL-166, BL-167 and BL-168
- Forcite - 30, 35, 40, 50, 60, 75, 80 and 90 per cent
- Fuse Powders - 35,40, 44, 53 and 65 seconds
- Gelatin Dough - 90 per cent
- Geogel - 60 per cent
- Giant Gelatin - 25, 30, 35, 40, 50, 60, 75, 80 and 90 per cent
- Guhr Dynamite
- Guncotton
- Gunpowder
- Hi-Velocity Gelatin - 60 per cent
- Hydromex, Hydromex M-2 and M-4
- Liquid Nitroglycerin
- Loshok - 20 per cent
- Monobel - No's. 4, 6, 7, 10, 11, 14 and X(EQ.S.)
- Nitrocotton
- Nitrone - S-1, T-1, T-3, T-4 and S-M
- Nitrone Quarry Primer and Nitrone S-1 Primer
- Nitropel
- Nitrox
- Pentaerythritol Tetranitrate
- Polar Stumping Powder - 20 per cent
- Primers - Pentolite, Pento-Mex I, II and III, and Pento-Mite A, B and C
- Primite - 70 per cent
- Pyromex - 60 and 70 per cent
- Seismic Gelatin - 60 per cent (for export only)

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured in Canada (cont'd)

Canadian Industries Limited (cont'd)
- Semi-Gelatin No's. 1, 2, 3, 4 and 5 (for export only)
- S.N.G.
- Stopeite - 25, 30, 35, 40, 45, 55, 65 and 70 per cent
- Straight Gelatin - 25, 30, 35, 40, 50, 60, 75, 80 and 90 per cent (for export only)
- Submagel - 40, 50, 60, 75, 80 and 95 per cent
- Trinitrotoluene
- Vibrex - 60 per cent
- Xactex - 75 per cent

Canadian Safety Fuse Company Limited, Brownsburg, Que.
- Detonating Fuse
- Hot Wire Fuse Lighters
- Igniter Cord - "Thermalite" Brand
- Igniter Cord Connectors - "Thermalite" Brand
- Safety Fuse

Consolidated Mining and Smelting Co., of Canada Ltd., Kimberley, B.C.
- Mining Explosives

Cyanamid of Canada Limited, Niagara Falls, Ont.
- Nitroguanidine

Delta Explosives Limited, St. Joseph du Lac, Que.
- Delgel - "100", "400" and "S-2"
- Deltite
- Deltex

DuPont of Canada Limited, Montreal, Que.
- DuPont Ditching Dynamite
- DuPont Extra No's. 1, 2, 3, 4 and 5
- DuPont Gelatin - 25, 40, 50, 60 and 75 per cent
- DuPont Stumping Dynamite
- Energex - 40, 50 and 60 per cent
- Energex FR - 25, 40 and 65 per cent
- Gelex-A - 1, 2, 3, 4 and 5
- Gypsal No's. 1 and 2
- Hi-Cap - 1, 2 and 3
- Hi-Det Primer
- Hi-Velocity Gelatin - 40, 60 and 75 per cent

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured in Canada (cont'd)

DuPont of Canada Limited (cont'd)
- NBL-101, NBL-102, NBL-103, NBL-104, NBL-201, NBL-301, NBL-302, NBL-304, NBL-307, NBL-309, NBL-402, NBL-404 and NBL-407
- Nilite FR and 310
- Nitramite and Nitramite FR
- Nitramon Primers
- Pelletol No's. 1 and 2
- Pentolite Primer
- Seismex - 40 per cent
- Seismogel - 60 per cent
- Seismograph "Hi-Velocity" - 60 per cent
- Semi-Gelatin No. 1
- Special Gelatin - 30, 35, 40, 50, 60, 75, 80 and 90 per cent
- Submarine Hi-Velocity Gelatin - 60 and 80 per cent
- Super "Tovex" Gel
- Tovex, Tovex A-2 and A-4
- "Trimtex"

Gevelot of Canada Limited, Saskatoon, Sask.
- Safety Cartridges

Iron Ore Company of Canada, Sept Iles, Que.
- Mining Explosives

Remington Arms of Canada Limited, Toronto, Ont.
- Safety Cartridges

Winchester-Western (Canada) Limited, Cobourg, Ont.
- Safety Cartridges

XL Explosives Limited, Hawkesbury, Ont.
- Safety Cartridges

Pursuant to Section 8 of the Explosives Act, ammonium nitrate blended with fuel oil is an authorized explosive.

Manufactured by Foreign Firms

Aktiebolaget Bofors, Nobelkrut, Bofors, Sweden
- Smokeless Sporting Powder
- Detonating Fuse (Bofors Type)

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

American Cyanamid Co., Latrobe, Pa.
- Fulminate of Mercury
- Detonators

Atlas Diesel Co., Stockholm, Sweden
- Engine Starting Cartridges

Atlas Chemical Industries Inc., Wilmington, Del.
- Atlas Aquatol
- Atlas Gelatin - 60 and 75 per cent
- Atlas RXL - 185 and 198
- Detonators
- Giant Gelatin - 40, 60 and 75 per cent
- Giant Gelatin, Hi-Velocity - 60 per cent
- Shaped Charges
- Subgel A

Austin Powder Co., Cleveland, Ohio
- Ammonia Dynamite - AL-4 and 60 per cent
- Apcomite 20-A
- Austinite No's. 15, 20 and 21
- Black Pellet Powder
- Detonating Fuse
- Primers - Pentolite, ANP-16 Amatol and ANP-16 Sodium Amatol

Leon Beaux & Co., Societa Italiana Munizioni, Milan, Italy
- Safety Cartridges

Baschieri and Pellagri, Bologna, Italy
- Smokeless Powder

Messrs. Germano Benzomi, Bergamo, Italy
- Safety Cartridges

Bermite Powder Co., Saugus, Calif.
- Baker Power Charge
- Firing Head Igniter

Bombrini Parodi-Delfino, Rome, Italy
- Safety Cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Cardox Corporation, Chicago, Ill.
- Cardox
- Cardox Heaters

Cartoucherie Francaise, Paris, France
- Primers and Primed Cases
- Safety Cartridges
- Smokeless Powder

Cascade Cartridge Co., Lewiston, Idaho
- Primers

E.I. DuPont de Nemours & Company, Inc., Wilmington, Del.
- Auxiliary Charges C. 63
- Black Fuse Powder
- Delay Assembly "Ledcore"
- Detonators and Electric Detonators
- DuPont Bulk Powder
- DuPont Ditching - 50 per cent
- DuPont Extra - A, C, E, F and G
- DuPont Gelatin - 25, 40, 50, 60 and 75 per cent
- Elcord Delay Unit
- Explosive Rivets
- Fulminate of Mercury
- Gelex - No's. 1, 2 and 3
- Hi-Velocity Gelatin - 40, 60 and 75 per cent
- Jet Tappers
- NBL-308
- Nilite 101 and 202
- Nitramon - A, 2 and S
- Nitramon Primer and Nitramon S Primer
- Nitramex - 2 and 2H
- Nitramite
- Nitramite Primer
- Nitrocellulose
- Nitrostarch
- Oil Well Explosives S.O.W.E. No. 1 and EL-431-A
- P.6 Seismograph Booster
- Pelletol No's. 1 and 2
- Pentaerythritol Tetranitrate
- Plastic Primer
- "Primacord" Booster

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

E.I. DuPont de Nemours & Company, Inc. (cont'd)
"Primacord" MS Connector
Primer HDP-1, HDP-2 and HDP-3
Red Cross Extra - 40, 50 and 60 per cent
Red Cross Extra (H.W.R.) - 40, 50 and 60 per cent
"Rock Breaker" Pellets
Shaped Charges
Sheet Explosive EL-506A
Smokeless Powders
Special Gelatin - 30, 40, 50, 60, 75, 80 and 90 per cent
Special Primer with Booster (4 x 7.5 lb.)
Submarine Hi-Velocity Gelatin - 60 and 80 per cent
Tetryl
Waterproof Booster C.66

Dynamit Nobel AG, Troisdorf, Germany
Delay Connector
Detonators and Electric Detonators
Detonating Fuse "Nobel Cord"
Safety Cartridges
Smokeless Powder

Ellefsens Tendskruefabrikk, Stokke, Norway
Time Fuses and Detonators for Whaling Guns

EM-GE Sportgerate K-G Gerstenberger & Co., Wurttemberg, Germany
Blank Cartridges

Ensign Bickford Company, Simsbury, Conn.
Detonating Fuse
Ignitacord
Igniter Cup
Lead Spitter
Low Energy Detonating Cord
Pull-Wire Safety Fuse Lighter

Farbenfabriken Bayer A.G., Leverkasen, West Germany
Dinitrotoluene

Federal Cartridge Corporation, Minneapolis, Minn.
Safety Cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Federal Laboratories, Pittsburgh, Pa.
- Lachrymatory Cartridges
- Powder Loads

Gevelot, S.A., 50 Rue Ampere, Paris, France
- Safety Cartridges

Giullio Fiocchi, Lecco, Italy
- Power Tool Cartridges
- Primers and Percussion Caps
- Safety Cartridges

Go Oil Well Services Inc., Fort Worth, Texas
- Jet Perforators

Greenwood & Batley Ltd., Leeds, England
- Safety Cartridges

Gustav Genschow & Co., A.G., Hamburg, Germany
- Safety Cartridges

Haerens Ammunition Arsenals, Denmark
- Safety Cartridges

Haerens Krudtvaerk Frederikavaerk, Denmark
- Safety Cartridges

Hercules Powder Company, Wilmington, Del.
- Detonators and Electric Detonators
- Gelatin Oil Well Explosive
- Explosive E.P. 172-1 and 2
- Gelamite D
- Gelatin Extra - 40 and 60 per cent
- High Pressure Gelatin - 60 per cent
- Nitrocellulose
- Smokeless Powder
- Titan Booster 20
- Vibro Caps
- Vibrogel B and 3
- Vibronite B

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Hirtenberger Patronen, A.G., Hirtenberg, Austria
- Primers and Primed Cases
- Safety Cartridges

Hull Cartridge Co., Hull, Yorkshire, England
- Safety Cartridges

Imperial Chemical Industries Limited, England
- Black Powder
- Cerium Low Tension Fusehead
- Detonating Relay
- Detonators and Electric Detonators
- Gunpowder
- Pentaerythritol Tetranitrate
- Percussion Caps
- Safety Cartridges
- Smokeless Powders
- Tetryl

Intermountain Research & Engineering Co. Inc., Salt Lake City, Utah
- Procore 3C Booster

Jet Guns Company, Fort Worth, Texas
- Shaped Charges
- Glass Gun Perforating Charges - G.G. 2, G.G. 4 and G.G. 7

K. & G. Oil Tool & Service Co. Inc., Houston, Texas
- Junk Shot

King Powder Co., Cincinnati, Ohio
- Black Pellet Powder

J.C. Kinley Co., Houston, Texas
- Shells - P #51, P #70 and P #100
- Kinley Sand Line Cutter

Lake Erie Chemical Co., Cleveland, Ohio
- Lachrymatory Cartridges

Lane-Wells Co., Houston, Texas
- Gun Perforator Cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Lapua Cartridge Factory, Lapua, Finland
Safety Cartridges

Mecca Cable and Service Inc., Houston, Texas
Magniset Cartridges

Mid Continent Torpedo Co. Ltd., Tulsa, Okla.
Red Head Firing Heads

Nitroglycerin Aktiebolaget, Gyttorp, Sweden
Shotgun Tracer Cartridges

Omnipol Ltd., Prague, Czechoslovakia
Safety Cartridges

A.B. Norma Projektilfabrik, Amotfors, Sweden
Safety Cartridges

Olin Mathieson Chemical Corp., East Alton, Ill.
Cyclonite
Detonators and Electric Detonators
Kiln Gun Shells
Linemen's Flare Lights
Normal Lead Styphnate
Railway Fusees
Railway Torpedoes
Safety Cartridges, Western and Winchester
Smokeless Powder
"Tempotool" Cartridges

Osterreichische Jagdpatronenfabrik, Vienna, Austria
Safety Cartridges

Oy Sako, AB, Finland
Safety Cartridges

T. Page-Wood Limited, Bristol, England
Safety Cartridges

Patronenfabrik, A.G., Solothurn, Switzerland
Safety Cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Perforating Gun Atlas Corporation, Houston, Texas
Jet Perforating Charges

Petroleum Tool Research Inc., Fort Worth, Texas
Detonator Assembly
Vibro-Shot Charge Assembly

Pawam-Pionki, Warsaw, Poland
Safety Cartridges

Poudreries Nationales, France
D-2 Propellant Powder

Poudreries Royale De Wetteren "Cooppal & Cie, S.A.", Brussels, Belgium
Nitrocellulose
Safety Cartridges

Povazska Strojarne (Kovo Ltd.) Bystrica, Czechoslovakia
Safety Cartridges

Pringle Powder Company, Bradford, Pa.
Liquid Nitroglycerin

Remington Arms Co. Inc., Bridgeport, Conn.
Safety Cartridges - Remington, Peters and Springfield
Stud Driver Cartridges

Rey Freres, Paris, France
Detonators and Electric Detonators
Detonating Fuse - Plastex and Duplex
Safety Cartridges
Safety Fuse TT, TR

F.J. Roberts Squib Company, Punxsutawney, Pa.
Miner's Safety Squibs

Rohm-Gesellschaft, Sontheim/Brenz, Kreis Heidenheim, Germany
Blank Cartridges
Signal Cartridges

Schaffler & Co., Vienna, Austria
Electric Detonators

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Karl Schermer and Co., Karlsruhe, West Germany
Animal Stunner Cartridges

Standard Railway Fusee Corporation, Boonton, N.J.
Railway Torpedoes

AB Svenska Metallverken, Vasteras, Sweden
Safety Cartridges

Temple Cox Development Co. Ltd., Bromley, Kent, England
Animal Stunner Cartridges

Trojan Powder Company, Allentown, Pa.
Nitrostarch
Trojan 40 per cent S, 50 per cent S, ESX, ESX-LD, PT-3X and TL-501-B

Weatherby's Sporting Goods Co., South Gate, Calif.
Safety Cartridges

AUTHORIZED FIREWORKS

Canadian Manufacturers

W.F. Bishop & Son Limited, Toronto Ont.
Canadian Industries Limited, Montreal, Que.
Canadian Safety Fuse Company Limited, Brownsburg, Que.
Dominion Fireworks Co. Ltd., Dixie, Ont.
Hand Chemical Industries, Cooksville, Ont. and Papineauville, Que.
Universal Pyrotechnics, Orangeville, Ont.

Foreign Manufacturers (Certain Fireworks Authorized*)

Acme Sparkler and Specialty, River Grove, Ill.
American Railway Signal Company, Fostoria, Ohio.
Anthes Division Gleason Corp., Fort Madison, Ohio.
Astra Fireworks Ltd., London, England.
M. Backes' Sons Inc., Wallingford, Conn.
E. Benjaminson, Falu Pyrotekniska, Industri, Falun, Sweden.
J.G.W. Berckholtz, Hamburg-Bahrenfeld, Germany.

*A list of authorized fireworks is on file in the office of the Explosives Division. Information may be obtained on request.

AUTHORIZED FIREWORKS (cont'd)

Foreign Manufacturers (cont'd)

Hermann Bischoff, Bremen, Germany.
Brock's "Crystal Palace" Fireworks Ltd., Hemel Hempstead, Herts., England
Oswald Bradley Ltd., Southport, Lancs., England.
Brookside Pyrotechnic & Chemical Co., Elkton, Md.
Bryant & May Ltd., London, England
Contimetal Industry (Hemel Hempstead) Ltd., Hemel Hempstead, Herts., England
EM-GE Sportgerate K-G Gerstenberger Co., Wurttemberg, Germany.
Erme-Werke, GMBH, Dachau-Munchen, Germany.
Exportvertrieb Pyrotechnik, Hamburg, Germany
Thos. Hammond & Company, Craigmillar, Edinburgh, Scotland
Haley & Weller Ltd., London, England.
Harvell-Kilgore Corporation, Bolivar, Tenn.
Hitt Fireworks Company Limited, Seattle, Wash.
Hudson Fireworks Display Company, Hudson, Ohio.
Illinois Fireworks Co., Danville, Ill.
Interstate Fireworks Manufacturing and Display Co., Bridgewater, Mass.
James Pain & Sons Ltd., Eastfield, Mitcham, Surrey, England
Japan Fireworks Trading Company Ltd., Tokyo, Japan
Jatina Manufacturing Co. Inc., Mount Vernon, N.Y.
Keystone Fireworks Manufacturing Co. Inc., Dunbar, Pa.
Lakeside Railway Fusee Company, South Beloit, Ill.
Lenover Corporation, Chester, Pa., and Lenover, Pa., (J. Halpern, Pittsburg, Pa., Distributors)
Marutamaya Ogatsu Fireworks Co., Tokyo, Japan
National Fireworks Incorporated, West Hanover, Mass.
New Jersey Fireworks Mfg. Co. Inc., Elkton, Md.
S.V. Olsen, Valby Tingsted, 10 Kobenhavn VBY, Denmark
Olin Mathieson Chemical Corporation, New Haven,Conn.
N.V. Pyro, Klazienaveen, Holland
Penguin Associates Inc., Devon, Pa.
Pyro-Chemie, (Hermann Weber & Co.) Eitorf/Sieg, West Germany
Pyrotechnischen Fabriken, Wuppertal-Ronsdorf, Germany
Pyrowerk, Hamburg-Neugraben, Germany
Reliance Snap Company, Bishop's Stortford, Herts., England
Richard Appel's Jo King, New York, N.Y.
Schermuly Pistol Rocket Apparatus Ltd., Newdigate, Surrey, England
Schiebeler & Co., Hamburg, Germany
Shioji and Co. Ltd., Osaka, Japan
Societe Pyragric, Rillieux (Ain) Banlieue de Lyon, France
Standard Fireworks Limited, Huddersfield, England
Standard Railway Fusee Corporation, Boonton, N.J.

AUTHORIZED FIREWORKS (cont'd)

Foreign Manufacturers (cont'd)

Stehling and Co., Hamburg, Germany
The J. & E. Stevens Sales Co., New York, N.Y.
Superior Signal Co. Incorporated, South River, N.J.
United Fireworks Manufacturing Company, Dayton, Ohio
U.S. Fish and Wildlife Service, Pocatello, Idaho
Van Karner Chemical Arms Corporation, New York, N.Y.
Messrs. Waeco Ltd., High Post, Salisbury, England
Joseph Wells & Sons Limited, Dartford, Kent, England
Joh. Chr. Wendt, Hamburg, Gr. Borstal, Germany
Wischo-K.G. Wilsker Co., Erlangen, West Germany
Wunderkerzen-Werk Carl Flemming, Hamburg-Neugraben, Germany

Chinese Firecrackers with gunpowder composition, not exceeding 2 inches in length and 1/4 inch in diameter, and small Chinese Fireworks, are authorized when found to function satisfactorily on examination at port of entry.